



CS Bits & Bytes is a bi-weekly newsletter highlighting innovative computer science research. It is our hope that you will use CS Bits & Bytes to engage in the multi-faceted world of computer science to become not just a user, but a creator of technology. Please visit our website at: <http://www.nsf.gov/cise/csbytes>.

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Artificial Intelligence

A Robot that won Jeopardy!!! Many people thought it couldn't be done, but in February of 2011, Watson, a robot created by IBM, beat Jeopardy!'s most celebrated winners in the show's first and only human-versus-machine match-up.

MUST SEE!



See an interview of Dr. Ferrucci by Lisa Joy Zgorski of NSF and Helen Hastings, a high school senior and NCWIT Aspirations in Computing Award Winner at: http://www.nsf.gov/news/mmg/mmg_disp.cfm?med_id=72072. Video courtesy of NSF.

content, so that there could be relevance in society. They aimed to develop a robot able to thrive in a world of natural language, where words take on a variety of meanings based on the context and intonation of the conversation! An important attribution of Watson's success is its ability to automatically learn and combine accurate confidences across a wide array of algorithms and over different dimensions of evidence. High precision and accurate confidence computations are critical for real business settings where helping users focus on the right content sooner and with greater confidence can make all the difference.

The potential impact for systems like Watson is huge! Fields from healthcare to technical support can be drastically improved with the implementation of a Watson-like system, whether it be in diagnostic assistance or in help-desk centers.



Dr. David Ferrucci. Photo courtesy of David Ferrucci.

Watson is an artificial intelligence computer system that integrates natural language processing, information retrieval, machine learning, knowledge representation and reasoning and massive parallel computation -in other words, a suped-up Robot!

IBM's DeepQA Project began by exploring how integrating the aspects of computer science described above could advance science – primarily in the application of automatic question answering. They wanted to develop a computer system that could directly and accurately answer peoples' questions over a broad domain of human knowledge.

Conventional wisdom would have one assuming that Watson is simply a massive database of anticipated questions and answers. However, this is not the case. The developers of the project sought to build a computer that could enable better, faster decision making over unstructured and structured



Watson competing against Ken Jennings and Brad Rutter on Jeopardy! Photo courtesy of IBM.

Who thinks of this stuff? Dr. David Ferrucci is an IBM Fellow and the lead for the team that developed Watson. He has been at IBM's T.J. Watson's Research Center since 1995, where he heads up the Semantic Analysis and Integration Department. Dr. Ferrucci focuses on technologies for automatically discovering valuable knowledge in natural language content and using it to enable better decision making. Dr. Ferrucci enjoys spending time with his wife and two daughters.

Links:

To learn more about Watson, visit: <http://www-03.ibm.com/innovation/us/watson/> (Be sure to watch the video!).

To read more about IBM's Deep QA Project, go to: <http://www.research.ibm.com/deepqa/deepqa.shtml>.

Read what Alex Trebek, host of Jeopardy! had to say about Watson: <http://techland.time.com/2011/02/15/behind-the-scenes-with-jeopardys-executive-producer-and-alex-trebek>.

Activity:

This activity is designed to help students realize what Watson must go through to determine the proper response (the question) for a Jeopardy! clue.

1. Assign one student the job of timer and another student the job of question reader.
2. Have pairs of students sit down at 2-4 separate computers connected to the Internet.
3. Instruct the reader to read aloud a Jeopardy! clue from the table below (note that words in brackets are the clue headings).
4. As soon as he/she is done reading, the timer should start the count, and the students at the computers should work to find the question for the clue.
5. When a team has formed their response (the question), they should raise their hands and the timer should take note of the time. Continue in this way until all teams have formed a response.
6. Once all teams have a response, instruct the first team to read their question aloud. See if the other teams agree or disagree.
7. Reveal the correct response and Watson's response.
8. Have a brief discussion about the different responses, including Watson's, and why the different responses may have occurred.
9. Repeat steps above for a few more Jeopardy! clues.
10. Have a class discussion about the amount of time it took the students to come up with questions for the clues and compare that with the average time Jeopardy! players have to play (3-5 seconds).

Clue	Correct Answer (What is.....)	Watson's Answer (What is.....)
From the Latin for "End", this is where trains can also originate.	Terminal	Finis
It was the anatomical oddity of U.S. Gymnast George Eyser, who won a gold medal on the parallel bars in 1904.	He's missing a leg	Leg
[The decade when] the first modern crossword puzzle is published & Oreo cookies are introduced.	1910's	1920's
Stylish elegance, or students who all graduated in the same year.	Class	Chic
In May 2010 5 paintings worth \$125 million by Braque, Matisse & 3 others left Paris' museum of this art period.	Modern Art	Picasso
Its largest airport named for a World War II hero; its second largest, for a World War II battle.	Chicago	Toronto?????
As of 2010, Croatia and Macedonia are candidates but this is the only former Yugoslav republic in the EU.	Slovenia	Serbia
[Also on your Computer Keys] a loose-fitting dress hanging straight from the shoulders to below the waist.	Shift	Chemise
The New Yorker's 1959 review of this said in its brevity and clarity it is "Unlike most such manuals, a book as well as a tool".	The Elements of Style	Dorothy Parker

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